REMARKS

I. PENDING CLAIMS

Claims 1-16 and 70-73 are pending in this application.

II. REJECTION OVER KEISLING IN VIEW OF TITANIUM '95

In paragraph 2 of the Office action, the Examiner has rejected claims 1-3, 11, 13, and 70-73 under 35 U.S.C. § 103(a) as obvious over Keisling (WO 98/42460) in view of Titanium '95: Science and Technology (Titanium '95). Applicants respectfully traverse this rejection and request reconsideration and withdrawal thereof.

Keisling describes a rather elaborate method for forming a cast and forged metal article that includes (1) preparing an expandable pattern of the part to be cast, (2) dipping the pattern into a slurry of fused silica and a binder to form a moist coating, (3) sprinkling silicon carbide grit on the moist coating (4) drying the moist coating, and (4) repeating these steps until a shell of the desired thickness is built up to form a mold, and then (5) casting the metal article in the mold. Nowhere does Keisling teach or suggest the use of a metal mold, as recited in Applicants' claims.

The Examiner recognizes this deficiency, and cites the Titanium '95 reference in an attempt to cure it. However, the Examiner has not explained WHY one of ordinary skill in the would have been motivated to combine the teachings of Titanium '95, which is directed to techniques for preparing automotive and aerospace parts using a permanent mold, with those of Keisling. In fact, there are several reasons

why one of ordinary skill in the art of producing wrought components would not have been motivated to make such a combination.

First, as stated in Titanium '95, the permanent mold process includes designing and fabricating a die, followed by vacuum casting directly into the die, followed by post-cast processing, such as isostatic pressing, heat treatment. Titanium '95 also discloses that the chemical milling typically necessary with investment casting is not needed with the permanent mold casting disclosed therein. This publication and the knowledge it contains was available in 1997 when Keisling first filed his patent applications. Nevertheless, Keisling devotes considerable time and effort to developing an improved investment casting technique, and describes this technique in great detail as forming a part of his invention. The logical conclusion to be drawn is that the benefits extolled by Titanium '95 over "conventional" investment casting processes were not benefits with respect to the (then) new investment casting process disclosed by Keisling. If they were, Keisling would not have developed his new, single-use mold casting process. Because of this, and because casting with a single-use mold casting process is fundamental to the disclosure of Keisling, combining the teachings of Titanium '95 with those of Keisling would destroy the process of Keisling, and goes against the very essence of what Keisling teaches to one of ordinary skill in the art.

Second, neither document indicates or suggests that the microstructural or mechanical properties of materials prepared by the Keisling improved investment casting process are equivalent to the properties of materials prepared according to the

permanent mold process disclosed in Titanium '95. This is hardly surprising, since Keisling is directed to methods for preparing medical implants, typically cobalt-chrome alloys, stainless steels, or titanium, while Titanium '95 is directed to methods for preparing components for aerospace and automotive hardware from titanium aluminide alloys. However, the differences in end uses and the subsequent differences in microstructural and mechanical properties of articles prepared by the respective processes does indicate that the processes are not interchangeable equivalents, as the Examiner appears to assume. Moreover, the investment casting process disclosed by Keisling is suitable for producing blank materials that will be subsequently subjected to extrusion, closed die forging, or both. The permanent mold casting process of Titanium '95 contemplates casting into basically final form, with only conventional post-casting processing. Forging or extruding is clearly not contemplated by Titanium '95

Third, the process disclosed by Keisling was acknowledged by Applicants in the specification at page 1 thereof. As Applicants pointed out there, Keisling does not teach or suggest a casting process using a permanent mold, or recognize the advantages in ductility and refined grain microstructure obtained as the result of the rapid heat transfer provided by a metal mold. Titanium '95 does not teach or suggest that the cast titanium aluminide parts prepared according to its teachings should or could be forged. To the contrary, Titanium '95 teaches that only normal post-cast processing and machining is needed for these parts.

Neither reference, therefore, suggests combination with the teachings of the other; to the contrary, each reference teaches away from such a combination. Absent some motivation to combine the reference teachings, the Examiner has failed to establish a prima facie case of obviousness, and the rejection should be withdrawn.

Moreover, even if the references teachings were combined in the manner that the Examiner suggests, the claimed invention would not be obtained. The teachings of the references, even when taken together, do not suggest that the use of permanent metal molds would provide sufficient rapid heat removal that a process involving casting and forging could be substituted for a conventional forging process in the production of an article having a ductility and a strength sufficient to allow the article to be used as an orthopedic or other surgical component. Again, the Examiner has failed to establish a prima facie case of obviousness, and this rejection should therefore be withdrawn.

III. REJECTION OVER KEISLING/TITANIUM '95 IN VIEW OF DAVIDSON

In paragraph 3 of the Office action, the Examiner has rejected claims 4-6 as obvious under 35 U.S.C. § 103(a) over Keisling (WO 98/42460) in view of Titanium '95: Science and Technology (Titanium '95), and further in view of Davidson (U.S. Patent No. 5,498,302). Applicants respectfully traverse this rejection and request reconsideration and withdrawal thereof.

First, Applicants note that the Examiner mentions a reference to "Ruff et al." that does not appear to be of record in this application. Accordingly, Applicants

assume that the Examiner refers to Titanium '95, and the discussion below reflects that assumption.

First, Davidson does nothing to cure the deficiencies of Keisling and Titanium '95 noted in the arguments above, which are incorporated herein by reference. Second, the claims rejected by the Examiner in this rejection recite articles made of different alloys that can be produced by the claimed process. The Examiner cites Davidson as teaching that it is known to make medical implants from titanium alloys, zirconium alloys, and stainless steel. While that may well be, it does not provide one of ordinary skill in the art with any motivation whatsoever to modify the Keisling process to (1) use a permanent metal mold (as discussed in more detail above), (2) use the resulting process to prepare articles from any alloy that has previously been used to make medical implants. Yet, that is precisely where the logic behind the Examiner's rejection leads: if a reference can be found that teaches a particular alloy can be used to make a medical advice, then it would have been obvious to one of ordinary skill in the art to use the process of Keisling (modified to include a permanent metal mold) to produce an article made from that device.

Unfortunately, the Examiner fails to address or explain how the worker is supposed to know whether, for a particular alloy (and without hindsight reference to Applicants' own disclosure), the resulting article will have the necessary ductility and strength to be used as a medical implant. Put another way, the Examiner has failed to explaine why it should be assumed (absent any teaching or suggestion in the references) that, for any of the alloys disclosed in Davidson, a permanent metal mold

will remove heat sufficiently fast to give the necessary ductility and refined grain structure needed to use the alloy in a medical implant. Absent some persuasive explanation as to why this should be the case, Applicants submit that the Examiner has failed to establish a prima facie case of obviousness, and that this rejection should be withdrawn.

IV. OBVIOUSNESS REJECTION OVER KEISLING, TITANIUM '95, AND HTMMC

In paragraph 4 of the Office action, the Examiner has rejected claims 7 and 14 as obvious under 35 U.S.C. § 103(a) over Keisling (WO 98/42460) in view of Titanium '95: Science and Technology (Titanium '95), and further in view of High Temperature Metal Mold Casting (HTMMC). Applicants respectfully traverse this rejection and request reconsideration and withdrawal thereof.

As with Davidson, the Examiner appears to have found a document that discloses something similar to what is recited in the dependent claims, and attempts to combine the teachings of the document with those of Keisling and Titanium '95. However, the Examiner has once again failed to explain WHY one of ordinary skill in the art would have been motivated to make the combination. Moreover, even if the combination were made, the result would not be Applicant's invention, for the reasons discussed at length above. For each of these reasons, Applicants' submit that the Examiner has failed to establish a prima facie case of obviousness, and that this rejection should be withdrawn.

Moreover, HTMMC suggests using gravity metal molds to cast parts made from Al, Zn, Mg, and Cu based alloys. Nothing in HTMMC suggests that this technique would be suitable for casting titanium, cobalt chrome, or stainless steel alloys. Thus, a worker of ordinary skill in this art would have had no motivation to combine the teachings of HTMMC with the combined teachings of Keisling and Titanium '95, assuming arguendo that such a combination would have even been appropriate (which it is not, for the reasons given above).

For the reasons given above, Applicants respectfully submit that the Examiner's rejection is in error, and should be withdrawn.

V. OBVIOUSNESS REJECTION OVER KEISLING, TITANIUM '95, AND VACUUM DIECASTING

In paragraph 5 of the Office action, the Examiner has rejected claims 8-10, 12, 15 and 16 as obvious under 35 U.S.C. § 103(a) over Keisling (WO 98/42460) in view of Titanium '95: Science and Technology (Titanium '95), and further in view of Vacuum Diecasting (VC). Applicants respectfully traverse this rejection and request reconsideration and withdrawal thereof.

As with Davidson and HTMMC, VC does not cure the deficiencies of Keisling and Titanium '95 described above. Thus, even if VC were combined with these references in the manner suggested, the claimed invention would not have been obtained. As a result, the Examiner has failed to establish a prima facie case of obviousness, and the rejection should be withdrawn.

Applicants submit that the present application is in condition for immediate allowance, and an early notification to this effect is earnestly solicited.

The Commissioner is hereby authorized to charge any deficiencies or credit any overpayment to Deposit Order Account No. 11-0855.

Respectfully submitted,

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